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Abstract

Three cases were undertaken to assess perceptions and practices regarding the use and non-use of video conferencing to support group work. In spite of popular trends that suggest unlimited demand for new technology, subjects expressed reservations about abundant use of video. Instead, they seemed to perceive video as appropriate only for specific kinds of collaboration.

Introduction

Technological support for group work has been the focus of much research and much commercial endeavor in the past decade. Video capability, whether via networked computers or dedicated video conferencing facilities, comprises an interesting component of group support. Although initially very expensive, the cost of videoconferencing equipment has steadily decreased over the years, to the point that minimal video capability now is affordable to nearly anyone who wants it.

Given the general pattern of demand for technological advancements (i.e. if Intel builds a faster chip, and/or Microsoft offers more feature-laden software, consumers buy it), one might expect advancements in video technology to result in ubiquitous use. However, although distributed groups in general use video now more than ever before, video has not replaced other modes of communication.

This paper reports on a study undertaken to investigate the use, and non-use, of video as a means of supporting group work.

Background

There is no question that the personal computer has been a fantastically successful product in the market. Consumers seem anxious not only to buy the product, but to upgrade, enhance, and replace it with the newest version. Computer accessories also continue to gain popularity. The demand for newer, better, faster, and more feature-laden equipment seems to be describable with a line from a popular motion picture: "If you build it, they will come." As computing equipment has evolved, the emphasis has moved from data processing to communication. Thus, modems, for example, have become almost equally widespread. Other technologies are being coupled with internet capability to enhance desktop computing with such communication-aiding concepts as application sharing and video conferencing.

Although video conferencing technology has been available for some time, it has not experienced the same kind of proliferation to the point of ubiquity as the personal computer. Originally, the casual observer might have attributed the lack of demand to the high cost of video conferencing systems. However, current technology provides the necessary hardware and software to conduct video conferences over the internet, via a personal computer for less than $200 per station. Even with lower prices, business consumers have apparently not adopted video conferencing as the standard communication mode. The "theory" of unlimited demand that seems to apply aptly to personal computing in general apparently does not explain consumer behavior regarding video conferencing.

There are other theories that may help explain why video conferencing has not proliferated at the same rate as personal computers. Some well known examples include theories of information richness in communication media, social presence, and adoption and diffusion of innovation. Information richness predicts that users choose communication media based on the content of the message and the ability of the media to transmit that content. The main assumptions here are that generally media with the ability to transmit more information are better than medium which transmit less, and that the face-to-face meeting is both the best medium and the standard with which to compare other media. Thus, video conferencing would be predicted as a popular choice for communication that requires visual, as well as audible cues.

Social presence theory has some similarity to information richness theory. The main idea is that users will choose the medium that affords the appropriate amount of social presence, with face-to-face again being the obvious standard.

Theories on adoption and diffusion of innovation deal with different variables. For example, critical mass might be defined as the minimum number of installed units necessary for a given technology to become a standard choice within a specified domain.

Space constraints do not allow review of the literature on these theories in this paper.

Method and Subjects

The purpose of this study was to explore the use and/or non-use of video conferencing as a means to support group work. Three case studies examine three different

group configurations in different organizations. In all three cases subjects were interviewed regarding their use (or non-use) of video for regular group meetings, and their reasons for using or not using it. The subjects were interviewed informally, at their own site. In each case, the interviews involved several members of a group, who normally work together in a group context. Although the wording of the questions was not dictated by a formal questionnaire, each interview did include questions on the following points. How often do you choose to use each of several different communications technologies in support of your group's work (e.g. e-mail, telephone, fax, video conference, personal meeting, etc.)? What factors are considered in choosing which medium to use? In what circumstances would you choose to use which medium? In particular, when do (or would) you choose to use video? When and why do (or would) you choose to not use video?

In one organization, a team meeting was observed in addition to the interviews of individual team members.

The questions were posed to members of groups in three different organizational settings. The first was a software development team at a public utility. This team collaborated regularly with counterparts in another city. One member of the team (the leader) flew to the other site on a weekly basis, while the others collaborated via telephone, e-mail, and faxes (with the leader occasionally acting as a courier.) Video conferencing facilities were available at both sites, and the teams used this technology for special or important meetings.

The second group was a graduate level distance education class on decision support systems, taught by the author. Students in the class participated from several remote sites, linked by audio (two way) and computer video (one way) but no live video conferencing was available. In addition to class meetings, students were required to collaborate with one another on small team projects, in teams that spanned geographic separation.

The third group was at an insurance company. Several software development teams included at least one member per team who telecommuted. These teams communicated via telephone and e-mail, principally, with occasional face-to-face meetings and fax transmissions.

Findings

The interview with the subjects at the public utility included a general description of their team meetings and other collaborations. They explained that on very rare occasions all members from both teams have met for a face-to-face meeting. This, of course, involves much expense in terms of time and travel. Generally, they are able to collaborate sufficiently via e-mail and telephone. They use (audio only) telephone conferencing when it is deemed necessary, and video conferencing somewhat less frequently. When asked to elaborate on the criteria for audio-only versus video conferencing, the team members' conversation generally turned to the drawbacks of video conferencing: It requires advance preparation (scheduling the facility,) one cannot easily see all participants when the group size gets large, people generally feel uncomfortable on camera, etc. Some employees were so "camera shy" they purposely chose seats out of the lens' range or simply avoide the meeting altogether. Their bottom line seemed to be that video conferencing had enough drawbacks that they had decided to use it only for meetings that justified its use, for example when a new team was being formed for a special project. While the video facilities had been in high demand at first, their use declined after the novelty wore off.

At the insurance company, team members did not have video facilities and said they did not want them. When asked to explain why not, their responses varied but prominent among the responses were the following: we are able to do our work well enough without it, camera shyness, and (especially from the telecommuters) we don't want others to see how we look. Further questioning brought out some other interesting factors that might have relevance. For example, one of the most important criteria for choosing to use one medium (for example, e-mail) over another (for example, fax) was convenience. The fact that e-mail capability was "right in front of me" but the fax machine was "clear down the hall" (probably 30 seconds away) was enough to convince the user that e-mail was the preferred medium. In both of the first two cases, the subjects seemed to be united in their opinion about the use and usefulness of video conferencing. In the third case, there was some variation of opinion.

Students in the distance education class met one evening per week in university distance education sites. Each site served from one to ten students. Class lectures were transmitted to the sites, originating from the main university campus. At the sites, students heard a live transmission of the teacher's voice, and saw a video copy of the teacher's computer. The students each had a microphone, through which they could transmit in real time, their questions or comments. The channel was such that only one student could transmit at one time, therefore if two students spoke simultaneously, one transmission would effectively block the other. As a teaching situation this is far from optimal. The teacher gets no visual feedback and precious little audio feedback. Thus, confronted with a mostly silent loudspeaker, I found myself regularly asking, "Is anyone out there?" "Can you hear me?" The problem was compounded by a two-second delay in the transmission. Therefore, whenever I, as teacher, posed a question, I had to remember that the students would not hear it until two seconds after I had

spoken, and there would be another two seconds before I heard their response (assuming someone responded immediately). As this was a constant source of frustration throughout the several weeks of the course, I thought the students might agree with me that video capability would be a welcome enhancement.

However, the students disagreed, saying that they enjoyed the anonymity afforded by their geographic separation. Some said they were usually very shy in classroom situations but because they were "safely" out of sight, they felt bold enough to participate more in the class. One student stated that if she knew she would be seen by her teacher and possibly by fellow students via video, she would not take the class.

Discussion

Field research presents many difficulties for the researcher. While travel outside the laboratory can be time-consuming and expensive, the most vexing difficulty arises from the lack of control over variables. Another difficulty lies in acquiring samples of sufficient size to make statistical inferences. These cases were not meant to be analyzed statistically, and therefore cannot be meaningfully generalized to any population beyond the teams that were studied.

However, these cases do raise some interesting questions in light vendor hype and also about existing theories. Of course, vendors will claim that their video product will facilitate seamless collaboration and increase productivity while simultaneously saving thousands of dollars in travel expenses and lost time due to information poorer communication media. The reality, in the public utility case, was that the team leader still traveled almost weekly in spite of the (often idle) video conferencing facility just steps away from his office. Students and the insurance company employees found that audio was sufficient, and therefore either felt no need for, or felt motivation against, video capability.

Social presence and information richness theories suggest that video might be the medium of choice when face-to-face meeting is impossible, because it allows for communication that is similar to face-to-face communication. From the present cases, a question arises, why bother about social presence and information richness when less will suffice? It seems the telephone provides sufficient social presence for much of today's business, and when the telephone is deemed too much, e-mail serves handsomely. Thus, although the price of video equipment has decreased markedly, a corresponding increase in demand may not exist.

There remains the possibility that video conferencing has simply not yet reached the critical mass that will result in common and ubiquitous use. Further, it may be that we as a society have simply not yet learned to be comfortable with video interaction. Perhaps at some future date, video equipment will be considered as standard as the telephone is today.

Meanwhile, some questions remain to be answered. If video conferencing technology is currently not sufficient to eliminate, or at least significantly curtail the need for travel, what is lacking? Can we enhance the technology in some way to make video conferencing more useful (e.g. better compression techniques or more bandwidth)? Will desktop video conferencing provide enough convenience to convince users to prefer video communication over e-mail and/or other media? Is there really a need for more social presence than that afforded by the telephone?

Perhaps the technology is good enough as it is, and we need to learn how, when, and why to use it best.